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Selected Alberta Science and Research Success Stories: Volume III

ASRA

ALBERTA SCIENCE AND RESEARCH AUTHORITY

Selected Alberta

Science and Research

Success Stories: Volume III

Alberta Science and Research Authority (ASRA)
September, 1999

ALBERTA
MINISTER OF INNOVATION AND SCIENCE

MLA Cypress-Medicine Hat

As the Minister of Innovation and Science, it is my pleasure to present "Selected Alberta Science and Research Success Stories: Volume III." Like the previous volumes, these stories illustrate the many science and research successes we have had in our province, and the value they have brought to Albertans, the Alberta economy, and the global community.

In order to sustain Alberta's growth into the next century, it is vital that we invest in science and research to build Alberta's knowledge-based economy. It is through this investment in our innovation system that new ideas, applications and products will be generated, resulting in the quality of life we all enjoy. Innovations such as the ones contained within these pages are examples of what can be accomplished by investing in science and research, and illustrate that we have the capability to ensure that the research of today will lead to the successes of tomorrow.

I wish to express my sincere thanks to all the contributors, without whom there would be no success stories. We hope that you will enjoy this third volume and let us know your comments and suggestions.

Please feel free to share these wonderful Alberta Success Stories. We also invite potential contributors to let us know of other successful science and research stories in Alberta.

Sincerely,

Lorne Taylor

Dr. Lorne Taylor, Ph.D.
Minister, Innovation and Science
MLA, Cypress-Medicine Hat

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THE ALBERTA SCIENCE AND RESEARCH AUTHORITY

In September, 1994 The Premier of Alberta, the Honourable Ralph Klein, established the Alberta Science and Research Authority (ASRA) to maximize the effectiveness of science and research as an integral component to the success of the province in the global economy. On April 1, 1999 the Alberta Science, Research and Technology Authority Act replaced the ASRA Act, incorporating the Alberta Research Council Inc. as a wholly-owned subsidiary of the Authority. The Authority (still referred to as ASRA) consists of a Board of Management of up to 25 people representing a cross section of the research and development community from academia, business and the public. ASRA reports to the Alberta Government through the Minister of Innovation and Science.

Mandate of the Alberta Science and Research Authority

The Authority, at the request of the Minister, must

- give the Minister advice respecting science, engineering and technology that affect resources or industry in Alberta;
- stimulate research and development and related scientific, engineering and technology activities in Alberta;
- develop and recommend science, engineering, technology and research policy and priorities;
- conduct an annual review and evaluation of all Government science, engineering, technology and research policies, priorities and programs, evaluate their compatibility with the economic and social policies and priorities of the Government and recommend to Executive Council the amount of public money that a program should receive;
- promote communication on matters related to science, engineering, technology and research among the science, engineering, technology and research community, the business community and the general public;
- encourage the science, engineering, technology and research community and its infrastructure in Alberta to attain international excellence to enable Alberta to be internationally competitive;
- carry out any other activities related to science, engineering, technology and research that the Minister considers appropriate.

Mission Statement of the Alberta Science and Research Authority

The Alberta Science and Research Authority will enhance the contribution of science and research to the sustainable prosperity and quality of life of all Albertans

For further information contact the Alberta Science and Research Authority (ASRA) at 780-427-1488 or e-mail: ASRA@gov.ab.ca or on the Internet at www.gov.ab.ca/sra.

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Foreword

As part of its mandate, the Alberta Science and Research Authority (ASRA) promotes communication on matters related to science, engineering, technology and research among the science, engineering, technology and research community, the business community and the general public. In accordance with this goal, ASRA has undertaken to collect a number of stories to illustrate the successes and value of science and research to Alberta, its people and its economic growth.

This is the third volume of stories, testimony to the wealth of successes we have in Alberta.The stories included in this volume came from many sources, from government agencies to start-up companies. A number of the stories continue to illustrate the successful joint partnership between public and private agencies. The sources for this volume of stories are:

- Alberta Agriculture Food and Rural Development – various divisions/centres
- Alberta Geological Survey
- Alberta Heritage Foundation for Medical Research
- Alberta Microelectronic Corporation
- Alberta Research Council
- Altarex Corp.
- Axion Spatial Imaging Ltd.
- Biotools Incorporated (BTI)
- Cell-Loc Inc.
- C-FER Technologies Inc.
- European Technologies International Inc.
- Galvanic Applied Sciences Inc.
- Lacent Technologies Inc.
- Madenta Inc.
- MCK Communications Inc.
- University of Alberta
- University of Calgary
- Wi-LAN Inc.

Without the cooperation and goodwill of these sources, this volume would not have been possible.

If you would like further information about the collection or about ASRA, please call 780-422-1057 or fax 780-427-0979 or email: asra@gov.ab.ca or look us up on the web at www.gov.ab.ca/sra

ARC's biotechnology facility manufactures fish vaccines for world export

The Alberta Research Council (ARC) has an exclusive manufacturing agreement with Victoria, B.C.-based Microtek International Ltd. to produce vaccines for the international aquaculture industry.

The intensive nature of fish farming creates a high risk of bacterial infections, which can wipe out entire populations of fish at aquaculture operations. Microtek's four licensed vaccines and five autogenous vaccines protect healthy salmon from a spectrum of both viral and bacterial fish diseases.

ARC assisted in the scale-up and product development of these vaccines. The focus is now on manufacturing. During 1997-98, ARC produced approximately 32,000 litres of the Microtek vaccines. Production at ARC has advantages of cost savings, access to skilled personnel, and 24-hour monitoring of the fermentation.

Currently Microtek's biggest market is in Norway and Chile, however fish farming is growing rapidly in Canada and the US. Accessing the US market is an important element in Microtek's business plan.

Upgrades to ARC's biotechnology manufacturing facility were key to attracting Microtek's business. The centre is western Canada's first large-scale veterinary biologicals manufacturing facility. It meets Agriculture Canada and USDA (US Department of Agriculture) regulatory standards, allowing products made in the ARC facility to be marketed throughout North America.

TECHNOLOGY: fish vaccines for the aquaculture industry

DEVELOPERS: Microtek International (1998) Ltd., Victoria; Alberta Research Council

BENEFITS

- cost-savings on producing fish vaccines at ARC Biotech
- ARC's biotechnology manufacturing facility is the only facility in western Canada that can produce animal health care products to US standards
- access to the US market provided by manufacturing at ARC will increase Microtek's market potential by 15- to 20-fold
- international sales for a Canadian aquaculture company
- new vaccines improve the potential for Canadian aquaculture operations

Source: Alberta Research Council. Contacts: Joanne Boothby, ARC, phone 780.450.5304, Email: boothby@arc.ab.ca; Julian Thornton, Microtek, phone 250.652.4482, Email: julian@pinc.com

Biopreservation technology to increase the storage life and safety of meat products

Bacteria are generally considered food contaminants, but researchers at the University of Alberta have found a way to use bacteria to increase the storage life and enhance the safety of meat products. Their discovery is the basis for the creation of a new Alberta company, CanBiocin Inc., which will further develop and market the technology.

CanBiocin's scientific team has discovered novel strains of lactic acid bacteria that occur naturally in meat, and have developed a way to use them to preserve meat. Patent applications have been filed.

When added back to meats under vacuum-packaged, refrigerated storage conditions, these bacteria markedly extend storage life. They control spoilage organisms and preserve acceptable odour, colour, and flavour for extended periods. They have additional safety benefits in that they have been shown to control the growth of *Listeria monocytogenes*, a dangerous food contaminant.

CanBiocin was formed by three scientists from the University of Alberta, Drs. Michael Stiles, Lynn McMullen and John Vederas, along with Dr. Madi Madiyalakan who has taken on the role of President and CEO of CanBiocin. Dr. Madilayakan was a member of the management team that founded AltaRex Corp.

TECHNOLOGY: process of using food-grade bacteria to preserve meat. Canbiocin is also applying this technology to the control of intestinal infections in farm animals, through the use of targeted probiotic cultures.

DEVELOPER: CanBiocin Inc., Edmonton

SUPPORTERS: Alberta Agricultural Research Institute, Farming for the Future, Natural Sciences and Engineering Research Council, Alberta Value Added Corporation (AVAC Ltd.), Alberta Heritage Foundation for Medical Research, and the University of Alberta.

BENEFITS:

- new, fast and cost-effective way to ensure the quality and safety of meat products
- increased shelf and storage life of meat products will enable Alberta companies to enter new geographic markets and build margin in new market segments, such as value-added and home replacement meals
- potential new products to control intestinal infections in animals
- costs may be reduced through improved inventory control and logistic efficiencies

Source: University of Alberta. Contact: Michael Stiles, Department of Agriculture, Food and Nutritional Science, University of Alberta, phone 780.492.2386, email: mstiles@afns.ualberta.ca

Fundamental research holds promise of new canola varieties

Certain types of canola, those known as winter types, must be exposed to extended periods of low temperatures in order to flower and set seed – a response called vernalization. Not surprisingly, this low temperature exposure also results in the tolerance to frost. Through their investigation of the relationship between frost tolerance and vernalization, a group of researchers from the University of Alberta have developed a promising new canola line that has tremendous potential as breeding and research material.

The research group, from the UofA's Department of Agricultural, Food and Nutritional Science, first developed a number of lines from crosses between two winter cultivars of canola. They identified one line that completely lacks a vernalization requirement, while retaining a very high degree of freezing tolerance. This line shows great potential as a new early maturing cultivar and breeding parent. Moreover, its winter genetic background makes it a highly desirable resource to bridge winter and spring gene pools for the creation of new germplasm.

The study's results clearly demonstrate that freezing tolerance and vernalization can be inherited separately. This is important information for breeders. Winter types have numerous attributes that would be useful to express in spring types, such as increased yield and better disease resistance. However, the vernalization requirement of winter canola is a detriment to breeders, who must add six weeks to every generation for winter cultivars.

RESEARCH: exploring the relationship between vernalization and freezing tolerance in canola

SCIENTISTS: Glen Hawkins and Anne Johnson-Flanagan, University of Alberta

SUPPORTERS: Alberta Agricultural Research Institute, Western Grains Research Foundation, Natural Sciences and Engineering Research Council, Agriculture and Agrifood Canada

BENEFITS:

- valuable insights into the relationship between freezing tolerance and vernalization. These will help define the genetic background required for the development of early maturing canolas.
- potential to increase freezing tolerance in canola, which currently limits the acreage seeded to spring canola

Source: University of Alberta. Contact: Anne Johnson-Flanagan, University of Alberta, phone: 780.492.3281, email: aflanaga@gpu.srv.ualberta.ca

Giardia vaccine for pets now ready for market

Three University of Calgary (UofC) researchers have come up with a new vaccine against Giardia, the intestinal parasite that is best known for causing severe cramps and diarrhea in humans. But this vaccine isn't for people, it's for their pets.

Giardiasis, known more commonly as "beaver fever", is usually thought of as a backpackers' disease, contracted after drinking untreated water in the wilderness. In fact, a major source of this intestinal parasitic disease is found much closer to home -- the family pet. Pet owners can become infected from contact with their pets' feces, with children most likely to be infected.

UofC's Drs. Merle Olson, Howard Ceri and Doug Morck have developed a vaccine that breaks the Giardia cycle by preventing pets from becoming infected. The vaccine has been released for pets in the United States. The pet vaccine is expected to be released in Canada, Australia and Europe over the next two years. The researchers are continuing to develop a vaccine for cattle, horses and sheep, as well as a human vaccine for Giardia.

TECHNOLOGY: vaccine for Giardiasis in animals (Giardiavax)

SCIENTISTS: Drs. Merle Olson, Howard Ceri and Doug Morck, University of Calgary

PRODUCT: Animal vaccine against infection by Giardia

SUPPORTERS: American Home Products, Fort Dodge Animal Health

BENEFITS:

- protect companion animals from disease
- reduce spread of disease to urban areas
- reduced incidence of human Giardiasis, especially in children
- potential to reduce Canada's health care costs due to pet-borne Giardia
- reduce Giardia in large animals such as cattle and sheep, thereby improving production
- prevent contamination of waterways by infected animals
- licensing and royalty fees paid to the University of Calgary

Source: University of Calgary. Contact: Dr. Merle Olson, phone 403.220.6836 (molson@ucalgary.ca), Dr. Howard Ceri, phone 403.220.6960 (ceri@ucalgary.ca)

Precision farming: Tailoring technology to increase farm profits and improve the environment

Advances in satellite and computer technology are now finding a practical application down on the farm. Alberta agricultural researchers are working on precision farming techniques -- combining the Global Positioning System (GPS) of satellites with Geographic Information Systems (GIS) to improve farm profits, while reducing chemical runoff from farming operations.

GPS technology allows users to determine their exact position on the Earth to within a metre. GIS is a mapping and analysis system that allows farm data such as soil type, fertility, pH, salinity and yield to be mapped and analyzed in any combination on a farm by farm basis. When the two techniques are combined, farmers gain access to a detailed database of the small-scale variability in each field.

Precision farming links this information with farm machinery. For example, fertilizers can be applied at higher or lower rates depending on the existing fertility variations in the field, and pesticides can be applied only to those areas where weeds or insects are a problem. The result is reduced use of chemicals, more effective applications, and reduced risk of environmental contamination.

In 1993 researchers at Alberta Agriculture and the University of Calgary began a four year research project using precision farming as the basis for fertilizer applications on test farms in Alberta. Early results indicate variable response to fertilizer depending upon soil type, history and climate. Net returns can increase by either increased yields or decreased fertilizer (without a yield increase). In 1998, six precision farming research projects and six demonstration projects were underway in Alberta.

TECHNOLOGY: Precision farming

LEAD ORGANIZATIONS: Alberta Agriculture, Food and Rural Development, University of Calgary, University of Alberta

SUPPORTING AGENCIES: Canada-Alberta Environmentally Sustainable Agriculture agreement, Agrium, Concord Inc, NovAtel, Westco, Bourgault, Ashtech.

BENEFITS:

- improved farm yields and profits: preliminary results indicate returns can increase by as much as $3 to $11 per acre over current fertilization methods
- optimum use of farm chemicals and fertilizers, resulting in less environmental impacts from farms
- potential to commercialize the technology and develop export markets

Source: Alberta Agriculture, Food & Rural Development. Contact Tom Goddard, Alberta Agriculture, phone 780.427.3720, Email: tom.goddard@agric.gov.ab.ca, Web: www.agric.gov.ab.ca

New comprehensive intelligence test replaces traditional test

A University of Alberta educational psychologist and his US colleague have developed a new intelligence test to replace the traditional IQ test. The UofA's Dr. J.P. Das and Dr. Jack Naglieri from Ohio State University designed the test to expand the traditional measurement of intelligence. The Das-Naglieri Cognitive Assessment System gives educators sophisticated ways to detect learning difficulties and prescribe ways to tackle those problems.

The new assessment system focuses on an individual's planning, attention, simultaneous and successive processing skills. It provides a new and more inclusive perspective on the cognitive processing strengths and weaknesses of children ages 5 through 17.

Unlike conventional tests, it will help clinical psychologists and educators identify attention deficit/hyperactivity disorders, traumatic brain injury, learning disabilities, mental retardation and giftedness.

The Cognitive Assessment System was published by Riverside Publishing in 1997. It is normed on 3000 children, ages 5 to 17. The test battery is in use in Canada, Europe, the US, South Africa, Australia and India.

DEVELOPMENT: Das-Naglieri Cognitive Assessment System, a new intelligence test, published by Riverside Publishing, Chicago (www.riverpub.com)

DEVELOPERS: Dr. J.P. Das, University of Alberta, and Dr. Jack Naglieri, Ohio State University

BENEFITS:

- Cognitive Assessment System helps parents and teachers identify children's cognitive weaknesses and strengths
- helps clinical psychologists and educators identify attention deficit/hyperactivity disorders, traumatic brain injury, learning disabilities, mental retardation and giftedness
- assists educators to prescribe remedial programs to help people cope with their disabilities

Source: University of Alberta. Contact: Dr. J.P. Das, Educational Psychology, University of Alberta, phone 780.492.4439, Email: j.p.das@ualberta.ca

New R&D institute focuses on multimedia

Multimedia is where it's at today. More and more of the systems we use in everyday life use multiple types of data including images, advanced graphics, text, video and audio. New applications are placing demands on the underlying computer and communications infrastructure. As a result there is a serious need for research and development in multimedia applications, and in enabling technologies such as data management, broadband networks, user interfaces, image processing, and software engineering.

Enter the Research Institute for Multimedia Systems (RIMS) at the University of Alberta. Opened in April 1998, RIMS provides a focus for multimedia R&D. The research activities supported by the institute range from basic research -- computer graphics, multimedia databases and image processing -- to more applied areas such as authoring, evaluation, and the social impact of multimedia. In addition, RIMS supports the use of multimedia in other research activities, such as advanced visualization facilities for exploring experimental data and the presentation of research results.

RIMS has several research laboratories supporting both advanced research and providing basic multimedia resources. The Advanced Visualization and Multimedia Research laboratory (AVMR) contains some of the most sophisticated visualization facilities currently available. This includes a multi-wall video projection system, also known as a CAVE™, the only facility of its kind in Canada. In addition to equipment, RIMS supports the definition and administration of research projects potentially involving researchers from several departments or faculties.

RESEARCH: multimedia research and development

GROUP: Research Institute for Multimedia Systems (RIMS), University of Alberta

SUPPORTERS: Natural Sciences and Engineering Research Council of Canada, Apple Canada, Hewlett Packard, Silicon Graphics, Sun Microsystems

BENEFITS:

- a boost for Alberta's growing multimedia industry. RIMS provides the interface between industry and university-based multimedia research. RIMS infrastructure is available to all companies in the multimedia industry.
- facilitates technology transfer through research contracts and the licensing and distribution of software and technology developed by RIMS researchers
- bolsters the University of Alberta's reputation in multimedia research and development. In the past five years, multimedia researchers at UofA have attracted over $2.5 million in funding from government and industry.

Source: University of Alberta. Contact: Dr. Mark Green, Director, Research Institute for Multimedia Systems phone 780.492.4584, email: mark@cs.ualberta.ca

Alberta scientist has major role in developing hepatitis B therapy

A new drug for hepatitis B has cleared clinical trials with flying colours. Thanks to research done at the University of Alberta, 3-thiacytidine (3TC or heptovir – zeffix in the U.S.) has been licenced for sale in the Philippines, Australia, New Zealand, Canada, United States, China and Singapore and is expected to be licenced in Europe and other Asian countries in the summer of 1999. Research that sparked the development of this drug began more than 10 years ago as a result of discussions between Dr. Lorne Tyrrell, Virologist and Internist, and Dr. Morris Robins, a chemist. Today, Dr. Tyrrell is Dean of the Faculty of Medicine and Dentistry at the University of Alberta, and Dr. Robins is a professor at Brigham Young University. They continue to collaborate on hepatitis B research.

Following that first discussion of the virology, Tyrrell's lab adapted a cell culture system to test compounds for anti-viral activity against hepatitis B (HBV). A novel approach to drug testing led to the filing of a patent in 1987. Tyrrell and Robins have identified two types of compounds that inhibit hepatitis B replication. For 10 years the company Glaxo Wellcome has supported the basic research and developmental work at the University of Alberta that has led to anti-viral compounds active against hepatitis B. Initially, compounds synthesized by Morris Robins were tested and found to be active and compounds provided by BioChem Pharma and licensed to Glaxo Wellcome led to the discovery of 3TC as an active agent. Heptovir was tested in cell culture systems and in animal models which led to the initial human trials which were conducted at the University of Alberta, John Hopkins University, and three European sites in 1993. This work, including the full spectrum from bench to bedside, led to the licensing of a successful product in Canada and the United States in December of 1998.

This means hope for the 300-350 million people worldwide who carry the virus. Each day about 4500 people die from the consequences of hepatitis B infection, making it the ninth leading cause of death in the world. Two major complications of chronic HBV infections are cancer of the liver and cirrhosis. Early intervention with lamivudine should decrease the chance of these complications. A spin-off benefit is that for those patients who require liver transplantation for end-stage liver disease as a consequence of hepatitis B, taking the drug before and after the transplantation reduces the chance of hepatitis B infection in the new liver.

RESEARCH: understanding the biology of the hepatitis B virus; developing effective anti-viral therapy

SCIENTISTS: Dr. Lorne Tyrrell, University of Alberta, and Dr. Morris Robins, Brigham Young University.

SUPPORTERS: Glaxo Wellcome PLC, Alberta Heritage Foundation for Medical Research, Medical Research Council, UofA Hospital Foundation

BENEFITS:

- first effective oral anti-viral therapy for chronic HBV infection
- reduces chance of hepatitis B infection in liver transplantation
- Dr. Tyrrell along with Dr. Robbins, won the 1998 Prix Galien Canada award.

Source: University of Alberta. Contact: Dr. Lorne Tyrrell, University of Alberta, phone 780.492.9728, email: lorne.tyrrell@ualberta.ca

Calgary researchers find possible cancer fighting gene

Drs. Karl Riabowol and Igor Garkavtsev have discovered a possible tumour-suppressing gene that could prove useful in cancer diagnosis and treatment.

Researchers around the world have so far identified about 20 tumour-suppressing genes. Some of these are now being used in clinical trials to treat various types of cancer.

The new gene discovered by the Calgary team, is named ING1, for INhibitor of Growth. This gene seems capable of telling normal cells when to stop growing, preventing the uncontrolled growth that is characteristic of cancer cells. The regulating mechanism is a protein that is produced by the gene, which is common in normal cells but is made in much lower amounts in many cancer cells. It now appears that the ING1 protein inhibits cell growth by activating another well-known tumour suppressor called p53.

In laboratory experiments, the researchers were able to stop cancer cells from growing by exposing them to high levels of ING1. The next phase of research will be to identify cancers that are characteristically devoid of ING1, as these offer the best possibility for treatment using the gene. The gene is also active as an agent that induces cellsuicide that is called apoptosis. Removal of ING1 from cells makes them resistant to apoptosis while increasing the protein promotes apoptosic cell death. Regulation of ING1 levels may therefore be useful in both inhibiting the growth of cancer cells and promoting their destruction by increasing ING1 levels respectively. This research is taking place at the University of Calgary, University of Chicago, and Genome Therapeutics Inc., Boston.

TECHNOLOGY: gene therapy

SCIENTISTS: Drs. Karl Riabowol and Igor Garkavtsev, University of Calgary

COLLABORATORS: Drs. Andrei Gudkov and Alexander Kazarov, University of Chicago; Drs Randy Johnston and Caren Helbing, University of Calgary

SUPPORTERS: Alberta Heritage Foundation for Medical Research, Medical Research Council of Canada, Alberta Cancer Board, National Cancer Institute of Canada, the Canadian Cancer Society

BENEFITS:

- may lead to new methods to diagnose and treat certain kinds of cancer
- improves scientific understanding of cell growth regulation
- bolsters Alberta's reputation for advanced medical research

Source: University of Calgary. Contact: Dr. Karl Riabowol, UofC, phone 403.220.8695; Email, kriabowo@ucalgary.ca

Canadian start-up makes a name in bioinformatics

BioTools Incorporated (BTI, www.biotools.com), a University of Alberta spin-off company, is making a big name for itself in the burgeoning field of bioinformatics; the application of information technology and computing power to the management and analysis of biological information. BTI was incorporated in 1995. Until 1996, BTI was a collaboration of four University of Alberta scientists: David Wishart, Jonathan Schaeffer, Brain Sykes, and Duane Szafron.

Since its incorporation, BTI has diversified into a company that specializes in the development and commercialization of computational tools for solving biological problems. The company provides the world's life science industries with advanced technology for the prevention, detection and treatment of disease; for accelerating the discovery and development of new drugs; and for research and development in agriculture, agrifood, aquaculture, nutraceuticals and forestry.

BTI has launched the first of a series of bioinformatics products: GeneTool™ for DNA sequence analysis and PepTool™ for protein sequence analysis. BTI software provides comprehensive sequence analysis and annotation solutions that transform sequence data into useful knowledge, helping researchers make fast, informed decisions for target identification and selection.

The company also specializes in data mining, data visualization and data analysis systems, including the application of fuzzy logic search engines and artifical intelligence, to gather, process, visualize and manage large volumes of biological information.

TECHNOLOGY: bioinformatics software, custom peptide synthesis, and NMR characterization to aid in the identification and design of novel drugs

SUPPORTERS: University of Alberta, the Protein Engineering Network of Centres of Excellence, the Alberta Heritage Foundation for Medical Research and the Industrial Research Assistance Program of the National Research Council

BENEFITS:

- BTI currently employs 26 people in the areas of computing science and biochemistry
- leader in the new field of bioinformatics
- bolsters Alberta's reputation as an R&D leader

Source: BioTools Incorporated. Contact: Dr. Ann Leins, VP Marketing, phone 780.423.1133, email: ann@biotools.com, Web: www.biotools.com

Chemist breaks through limitations

It's the small things that matter to University of Alberta chemistry professor Dr. Norm Dovichi. The focus of his research is the development of modern chemical microanalytical instrumentation. His goal is improving the instrumentation's sensitivity and accuracy. Dovichi has pioneered and perfected methods of separation and detection to the point where single molecules can be detected as their solution streams through the devices he has designed.

Dovichi's lab pioneered methods of using laser and fluorescent tagging for the analysis of biological substance. His team combined these developments with capillary electrophoresis in a device equipped with 96 capillaries of hollow optical fibre. The new device improves upon the sensitivity and productivity of commercial single-strand version. It also uses one-tenth the sample size and one-tenth the chemical reagents than current industry devices. The technology has been licensed to Perkins Elmer, who has reported over US$200 million in sales in the first few months that the sequencer was on the market. This instrument is the most successful new product launch in the history of biotechnology.

One of the major beneficiaries of Dovichi's research has been the Human Genome Project, an international scientific effort directed towards mapping the human genome – the sum total of the genetic material that is in every cell of the body. His breakthroughs came at a time when the efforts of scientists around the world to map DNA sequences were being hampered by the limitations of available technology. Dovichi's refined and ingenious instrumentation has sped up the project enormously.

The new techniques also hold tremendous potential for numerous aspects of medicine including forensic work, drug testing and blood analysis.

RESEARCH: development of modern chemical microanalytical instrumentation

SCIENTIST: Dr. Norm Dovichi, University of Alberta

SUPPORTERS: Natural Sciences and Engineering Research Council, Canadian Genetic Diseases Network, Canadian Bacterial Diseases Network, SCIEX, US Department of Energy, Department of National Defense, US National Institutes of Health, and Computing Devices Canada.

BENEFITS:

- Dovichi leads a large research group at the U of A – twenty (20) graduate students, five (5) postdoctoral fellows, four (4) technicians and six (6) undergraduates
- Dovichi's group is supported by external research funding in excess of $1 million/yr
- the group was the only one in Canada to be funded by the US Department of Energy's Human Genome Project

Source: University of Alberta. Contact: Dr. Wendy Lam, Technology Transfer Manager – Science, Industry Liaison Office, University of Alberta, phone 780.492.1865, email: ww.lam@ualberta.ca

Edmonton company tests cancer drugs

A novel and proprietary cancer therapy, developed by Edmonton-based AltaRex Corp., is now in North American clinical trials. The company's most advanced product is the OvaRex™ drug, an immunotherapeutic treatment for ovarian cancer. Clinical studies of the OvaRex drug are currently under way in Canada and the US.

The AltaRex approach to cancer immunotherapy is called Anti-idiotype Induction Therapy (AIT®). AltaRex's founder, University of Alberta Professor Emeritus Dr. Antoine Noujaim, was a key player in the serendipitous discovery and development of the murine antibody that led to the development of the AIT technology and AltaRex's product line.

AIT-based products are designed to stimulate the human immune system to produce its own effective anti-tumour response. The OvaRex product is an immunotherapeutic agent based on a modified murine monoclonal antibody that binds specifically, and with high affinity, to the cancer associated antigen CA 125, which is expressed by most epithelial ovarian carcinomas.

AltaRex is currently in two potentially-pivotal Phase IIb North American trials as well as an open-label, Phase II trial of its OvaRex immunotherapeutic antibody to treat late-stage ovarian cancer patients. The OvaRex antibody is the most advanced in a series of products based on the company's AIT technology. AltaRex is currently building a portfolio of AIT-based antibodies that target seven of the ten most lethal cancers.

AltaRex filed an Investigational New Drug application for its BrevaRex™ product with the Food and Drug Administration in the fall of 1998 and commenced a Phase I clinical trial. This product is designed to target the MUC-1 antigen that is expressed by several solid tumour cancers including breast, prostate, pancreatic, renal, lung and colorectal cancers.

TECHNOLOGY PLATFORM: Anti-idiotype Induction Therapy (AIT™), which AltaRex believes stimulates the body's immune system to produce its own specific and highly effective anti-tumour response.

BENEFITS:

- AltaRex is currently conducting human testing of a AltaRex™MA6 designed for the treatment of ovarian cancer.
- AltaRex's AIT-based product portfolio may have the ability to target seven of the most lethal cancers.

Source: AltaRex Corp. Contact: Edward Fitzgerald, Superintendent and CFO, AltaRex, phone 781.672.0142, email: info@altarex.com, Web: www.altarex.com

Immunogene therapy offers hope for cancer patients

A University of Alberta research team is set to begin clinical trials to test a revolutionary approach in the treatment of cancer -- immunogene therapy.

Drs. K.C. Petruk, I.F. Parney, L.J. Chang and a team of physicians and scientists at the University of Alberta, have successfully used the technique to stop the growth of tumours in mice that were bred to accept human tumours and immune cells. Phase 1 human clinical trials are scheduled to begin in the fall of 1998.

One of the hallmarks of cancer is that it depresses the immune system's ability to attack the cancer. Immunogene therapy is designed to stimulate the body's natural ability to fight cancer, slowing the growth of the cancer, and hopefully eliminating it altogether.

The technique involves taking cancer cells from patients and modifying the cells in a test tube by inserting three particular genes that produce molecules that are potent stimulators of the immune system. The modified cancer cells are irradiated to prevent them from growing inside the body, then injected back into the patient. The altered cancer cells are more visible to the body's immune system, and produce chemicals that stimulate the body's attack on the cancer, including the non-modified cancer cells in the patient.

The Phase 1 trial, at the University of Alberta Hospital, targets two particularly deadly types of cancer, glioblastoma (a type of brain cancer) and melanoma (a skin cancer). However the technique should be applicable to all types of cancer. The ultimate goal is a cure, but the more immediate expectation is a longer survival rate and improved quality of life, compared to existing cancer treatments.

TECHNOLOGY: immunogene therapy

SCIENTISTS: Drs. K.C. Petruk and L.J. Chang, University of Alberta

SUPPORTER: University of Alberta Hospital Foundation, Allard Foundation, Alberta Heritage Foundation for Medical Research

BENEFITS:

- potential to improve the quality of life of cancer patients
- potential to increase the longevity of patients with incurable forms of cancer
- offers a promising new avenue to pursue in the search for a cure for cancer
- bolsters Alberta's reputation as a leading centre for innovative medical research

Source: University of Alberta. Contact: Dr. K.C. Petruk, University of Alberta, phone 780.407.3029, email: kpetruk@gpu.srv.ualberta.ca

New treatment for Crohn's disease tested in Alberta

A University of Alberta gastroenterologist is leading the way in finding new treatments for Crohn's disease, a chronic condition causing inflammation of the intestine. A cure is not yet available, and current treatments such as steroids and immunosuppressive drugs are often ineffective and highly toxic.

The UofA's Dr. Bruce Yacyshyn and his team attracted worldwide attention for the discovery of one of the inflammatory abnormalities related to Crohn's disease. The abnormality produces proteins called adhesion molecules, which help white blood cells attach to intestinal tissue and play a role in the development of Crohn's. The discovery led to collaboration with a California pharmaceutical company, Isis Pharmaceuticals Inc. Isis has been an industry pioneer in a new technology — *antisense technology* — which inhibits the production of adhesion molecules using modified DNA molecules.

Yacyshyn led a Phase I-II clinical trial at the University of Alberta Hospital using one antisense inhibitor, ISIS 2302. After a single one-month course of treatment, the drug produced remission in seven of 15 trial patients, and significantly reduced or eliminated steroid requirements in the remaining eight, for the full five-month follow-up period. It did not cause any of the side effects associated with conventional drugs.

These promising, positive results are the world's first evidence of therapeutic benefits with a systemically administered antisense drug. Isis and partner German pharmaceutical giant Boehringer Ingelheim GmbH are proceeding with full-scale development of ISIS 2302. Yacyshyn is now heading a Phase III trial of the drug in 300 patients in North America and Europe.

RESEARCH: studies aimed at finding the cause of and effective treatments for inflammatory bowel diseases — Crohn's Disease and ulcerative colitis

SCIENTIST: Dr. Bruce Yacyshyn, University of Alberta

SUPPORTERS: ISIS Pharmaceuticals, Crohn's and Colitis Foundation of Canada

BENEFITS:

- potential to help – and possibly cure – people with inflammatory bowel disease, a debilitating condition where patients cycle between periods of sickness and health
- the new drug may be a potential treatment for other inflammatory diseases besides inflammatory bowel disease, including rheumatoid arthritis, psoriasis, ulcerative colitis and prevention of kidney transplant rejection

Source: University of Alberta. Contact: Dr. Bruce Yacyshyn, University of Alberta, phone 780.407.7574, email: bruce.yacyshyn@ualberta.ca

Understanding cell membranes leads to new disease therapies

Cell membranes are more than just soft walls that keep the "insides" in and the "outsides" out. Membranes play an active role in the life of cells. Studded with proteins acting like sensors, membranes pick up signals from the outside, communicate with other cell structures, and trigger responses to help the cell maintain its unique equilibrium. Some of the responses triggered by these membrane-associated proteins could have implications in a wide spectrum of diseases such as Alzheimer's, cystic fibrosis, cancer, muscular dystrophy, and arteriosclerosis.

Fundamental research on cell membranes is the focus of the Molecular Biology of Membranes Research Group in the Faculty of Medicine and Oral Health Sciences at the University of Alberta. The six-member research team is investigating membrane transporters of molecules and ions, protein targeting and translocation across biological membranes, and the role of membrane-associated proteins in the control of cell growth and cellular communications.

For example, Dr. Marek Michalak's research has focused on a protein called calreticulin. This research could have profound implications in treating a condition called restenosis, a form of blood vessel injury that occurs when people undergo balloon angioplasty as a treatment for heart disease. Although inflating a balloon in clogged vessels opens them, the resulting damage to the vessel walls can cause future clotting problems. However, restenosis does not occur when calreticulin is administered during the procedure. Dr. Michalak and a colleague have applied for a patent to use calreticulin to prevent restenosis.

RESEARCH: basic studies on biological membranes and intracellular organelles

SCIENTIST: Drs. Carol Cass, Joe Casey, Larry Fliegel, Bernard Lemire, Marek Michalak, Joel Wiener, University of Alberta

SUPPORTERS: Medical Research Council of Canada, Alberta Heritage Foundation for Medical Research, Heart and Stroke Foundation of Canada, Heart and Stroke Foundation of Alberta and Northwest Territories, Natural Sciences and Engineering Research Council of Canada, Muscular Dystrophy Association of Canada

BENEFITS:

- knowledge generated from this basic research may enable the development of novel therapies for a number of human diseases
- The Membrane Group is the highest ranked Medical Research Council program in Canada. This highlights the University of Alberta's reputation as a major centre for fundamental research on membranes.

Source: University of Alberta. Contact: Dr. Marek Michalak, Biochemistry, University of Alberta, phone 780.492.2256, email: marek.michalak@ualberta.ca

University of Alberta researcher sheds light on spinal arthritis

Arthritis is more than just a debilitating affliction. In fact, severe arthritis can reduce life expectancy by about fifteen years. Research at the University of Alberta is shedding light on a particularly debilitating form of arthritis called ankylosing spondylitis.

Ankylosing spondylitis primarily affects young males in their twenties or thirties. It causes inflammation of the joints and ligaments in the spine, sometimes causing the spinal bones to fuse. This results in a hunched posture and an inability to look from side to side. Afflicted persons have difficulty finding gainful employment, resulting in personal hardship as well as high demands on the health and social systems.

Researchers at the University of Alberta have found that people affected with the disease often have a particular gene in common. Some bacterial and viral proteins resemble this gene, and once the immune system is exposed to these pathogens it may respond by mistakenly attacking the gene long after the bacteria or virus has been eliminated. This may be the basis of the chronic inflammation typical of ankylosing spondylitis.

University of Alberta researcher Dr. Walter Maksymowych is evaluating how well existing medications for osteoporosis work on people suffering from ankylosing spondylitis. These drugs could be the key to treating the inflammation and bone thinning that is typical of this condition.

RESEARCH: understanding the genetic basis of spinal arthritis

SCIENTIST: Dr. Walter Maksymowych, University of Alberta

SUPPORTERS: Alberta Heritage Foundation for Medical Research, Medical Research Council of Canada

BENEFITS:

- potential to prevent loss of productivity of people with full careers ahead of them
- potential to substantially reduce costs to the health and social systems
- use of drugs currently used for other disorders, such as osteoporosis, may provide cost-effective treatment of ankylosing spondylitis, without the expense of developing new medications
- improved understanding of one form of arthritis might have benefits applicable to other forms of this debilitating disease
- supports Alberta's reputation as a key player in medical research

Source: Alberta Heritage Foundation for Medical Research. Contact: Dr. Walter Maksymowych, Rheumatology, University of Alberta Hospital, phone 780.407.1964

University of Alberta team develops ultrasensitive DNA technique

A team of scientists from the University of Alberta has developed an extraordinarily sensitive tool for detecting damaged DNA. It is being hailed as a breakthrough in understanding how the body responds to genetic injury.

The technique was developed by Dr. X. Chris Le, environmental health sciences, Dr. Michael Weinfeld, experimental oncology, and colleagues in the UofA's Faculty of Medicine and Dentistry. Their method is so powerful it can find one impaired DNA among a sample of one billion normal ones. It can detect fewer than 2000 damaged DNA bases in a minute sample, a 10,000- to 100,000-fold increase in sensitivity over current methods.

The scientists have gone beyond developing the technique to demonstrating its use in understanding DNA repair. DNA can be damaged by many things, ranging from ultraviolet radiation to cigarette smoke. Because the test detects damage to DNA at extremely low levels, it can be used to determine the degree of genetic damage caused by radiation or chemical pollution, which can ultimately lead to cancer.

One of the interesting findings from the research has important clinical implications on low dose radiation. Cells which were previously exposed to low levels of radiation repaired their DNA faster. The exposure appears to "toughen up" the cells and turn on the repair process.

RESEARCH: understanding DNA damage and repair, developing biomarkers for assessing environmental exposure to carcinogens

SCIENTISTS: Drs. X. Chris Le, Michael Weinfeld, James Xing, and Ms. Jane Lee, University of Alberta; Dr. Steven Leadon, University of North Carolina at Chapel Hill

SUPPORTERS: Natural Sciences and Engineering Research Council of Canada, National Cancer Institute of Canada, Alberta Cancer Board, US National Institutes of Health, Alberta Heritage Foundation for Medical Research.

BENEFITS:

- diagnostic tool to determine whether some workers in chemically hazardous industries are more at risk of cancer than others
- a step-by-step analysis to determine at what dosage a substance might tend to cause cancer or birth defects
- monitoring non-cancer cells that could be toughened to resist the lethal effects of radiation therapy

Source: University of Alberta. Contacts: Dr. Chris Le, University of Alberta, phone 780.492.6416; Dr. Michael Weinfeld, University of Alberta, phone 780.432.8438

University of Calgary a world leader in diabetes research

Diabetes mellitus and its complications are considered to be the third leading cause of death in North America, trailing only cancer and cardiovascular disease. More than one million individuals suffer from diabetes in Canada. Researchers at the Julia McFarlane Diabetes Research Centre (JMDRC) at the University of Calgary are leaders in the fight to treat, prevent and cure diabetes. Their work is some of the best diabetes research performed in the world.

The centre's chair, Dr. Ji-Won Yoon, made a very significant discovery in 1994 when he first showed how to prevent Type 1 diabetes from occurring in lab mice. (Type 1 diabetes occurs when the body's immune system destroys the insulin-producing islet cells in the pancreas.) Yoon and his colleagues were then able to prevent the recurrence of diabetes in mice which had received pancreatic islet transplants without the use of the immunosuppressive drugs. When used continuously, immunosuppressive drugs have serious side effects. Yoon cloned suppressor T cells which, when transfused prior to islet transplantation, resulted in complete cure of the animals from diabetes. This was the first discovery in the world to completely cure diabetes by islet transplantation without the use of immunosuppressive drugs. This method holds potential for future application to human Type 1 diabetes.

Recently, Yoon discovered that the suppression of the expression of an islet autoantigen, glutamic acid decarboxylase (GAD) prevented the development of diabetes in animal models. He also found that the immunization of diabetes prone animals with recombinant vaccinia virus expressing GAD at an early age could prevent the development of the disease.

Yoon is one of more than 20 researchers at the JMDRC. They are studying many aspects of the disease, from its genetic roots to how it affects eyesight and eating habits. One area of very active research is cellular and molecular studies on animal models of Type 1 diabetes to determine possible causes of the disease. Another area is insulin gene therapy, an exciting and novel approach to the cure of diabetes. Preliminary studies, in which animals have been injected with the human insulin gene, show the potential for promising results.

RESEARCH: studies on the cause, treatment, prevention and cure of diabetes

CENTRE: Julia McFarlane Diabetes Research Centre, University of Calgary

SUPPORTERS: Diabetes Association (Foothills), Medical Research Council of Canada, Canadian Diabetes Association, Juvenile Diabetes Foundation International

BENEFITS:

- potential to help – and possibly cure – people with diabetes, and those at risk for the development of this disease
- improved understanding of diabetes may have benefits applicable to other autoimmune diseases

Source: University of Calgary. Contact: Dr.Ji-Won Yoon, Director, Julia McFarlane Diabetes Research Centre, University of Calgary, phone 403.220.4569

Anti-vibration technology has worldwide applications

A Calgary company, incorporated in 1992, has become a technology leader in the automatic mechanical balancing of rotating equipment. European Technologies International Inc. (ETI) has patented its *Can Balance*™ anti-vibration technology and is pursuing licensing opportunities around the world.

The Can Balance technology, when combined with ETI's engineering expertise, can be applied to many types of rotating components to reduce or eliminate vibration and associated problems. The unique technology shifts counterweights automatically in order to adjust for any speed, and constantly monitors and adjusts balancing.

Potential applications are widespread. To date, the Can Balance system has been successfully developed, tested and applied to washing machines, medical laboratory centrifuges, automobile drive shafts and wheels, personal watercraft, snowmobiles, fans, reciprocating compressors, industrial washer/extractors, and power tools. For example, the giant Korean conglomerate Samsung has licensed the technology for commercial application in its washing machines. When Can Balance is fully commercialized at Samsung's factories, ETI will reap a US$3 royalty on every machine. In June 1998, ETI completed a multimillion-dollar deal with China's Jinan Washing Machine Factory, which gives the Chinese firm the right to build the Can Balance technology into their washers. The agreement could be worth as much as US$9.5 million in revenues for ETI.

ETI's newest product is the ETI CD-ROM Microbalancer which significantly increases the speed and accuracy of rotating CD-ROMs. It is nearing completion of the design and testing phase. ETI expects to achieve a minimum of 10% of the CD-ROM market by the year 2000.

TECHNOLOGY: *Can Balance*™ machine-balancing technology

DEVELOPER: European Technologies International Inc., Calgary

SUPPORTERS: National Research Council, Industrial Research Assistance Program

BENEFITS:

- worldwide licensing opportunities for Alberta technology. To date, the Can Balance system has been successfully developed, tested and applied to washing machines, medical laboratory centrifuges, automobile drive shafts and wheels, personal watercraft, snowmobiles, fans, reciprocating compressors, industrial washer/extractors, and power tools.

Source: European Technologies International Inc. Contact: Ron Stiven, Corporate Communications, ETI, phone 403.255.4225 ext 214, email: info@canbalance.com, Web: www.canbalance.com

Pipeline weld system monitor gives pipeline company a competitive edge

When OJ Pipelines, a Nisku-based pipeline construction company, decided to improve its weld technology, the company turned to the Alberta Microelectronic Corporation (AMC) for help. AMC designed and fabricated a new pipeline weld system monitor, including the hardware and firmware (a software program that controls the hardware).

The monitoring system assures high weld quality by recording and displaying three key parameters of the weld: weld current, weld tip voltage, and travel speed of the weld "bug" – a motor-driven automated welding unit that travels around the pipe. It is designed for any arc welding procedure and for data logging, and can withstand extreme weather conditions. OJ Pipelines is using the system to meet specific weld requirements, provide higher quality assurance to clients, and reduce costly repairs.

AMC engineers have now completed the development of a Robotic Welder Control Box, a digital control system for weld bugs. This will enable the welding operator to program the weld bug parameters and select from a multiple set of procedures and switch procedures on the "fly".

AMC engineers have also completed the development on the Weld Tag unit which links the physical weld joint to the monitor weld data and have completed the development of the Weld System Junction Box. The Junction Box unit ties the complete welding system together and supplies diagnostic information and fault recovery.

TECHNOLOGY: pipeline weld system monitor

DEVELOPER: Alberta Microelectronic Corporation

CLIENT: OJ Pipelines, Nisku

BENEFITS:

- cost-effectiveness and reliability have significantly increased since the new weld system monitor has been in use at OJ Pipelines. Repair rates have dropped to under two per cent, from eight to ten per cent previously.
- within less than four months after AMC took on the project, ten working units complete with software were operating in the field
- enhances Alberta's reputation in pipeline R&D

Source: Alberta Microelectronic Corporation. Contact: Tim Flynn, Alberta Microelectronic Corporation, phone 780.492.0321, ext. 272; email: flynn@amc.ab.ca

Alberta investigates coalbed methane as an environmentally friendly energy supply

The idea sounds strange at first -- reduce carbon dioxide (CO_2) emissions by producing more natural gas for power generation? But that's exactly what is proposed in a collaborative research project led by the Alberta Research Council (ARC).

The idea is to pump CO_2 into Alberta's vast coal beds, where the gas is absorbed by the coal, releasing coalbed methane gas in the process. The methane could be used to produce energy for Alberta's power plants or sold for profit, and the CO_2 from the methane combustion would be pumped back into the coalbeds to release more methane. Thus a closed loop is formed, with little CO_2 released into the atmosphere. CO_2 in the atmosphere is the primary greenhouse gas, considered to contribute to global warming.

During the initial proof-of-concept study and a later single well test at Fenn-Big Valley, Alberta, a team of ARC scientists determined that Alberta coal beds have a capacity to store large volumes of CO_2. In fact, some coals can absorb up to three times more CO_2 than methane under the same conditions.

The new process is successfully being used to enhance methane production at a field pilot in New Mexico. Many of Alberta's coalbeds are rich in methane, making Alberta an ideal location to further develop the new technology.

TECHNOLOGY: pumping CO_2 into coalbeds to release methane

DEVELOPER: Alberta Research Council

SUPPORTERS: Sproule International Ltd., Canadian Association of Petroleum Producers, IEA Greenhouse Gas R&D Programme, Alberta Department of Resource Development (formerly Energy), Environment Canada, Geological Survey of Canada, United States Department of Energy (U.S.), United Kingdom Department of Trade and Industry (U.K.), Gulf Canada Resources Limited, Burlington Resources (U.S.), BP Exploration (Alaska) Inc. (U.K.), Suncor Energy, Canadian Fracmaster, Air Liquide Canda, TransAlta Utilities, EPCOR Utilities, Western Economic Partnership Agreement (WEPA), PanCanadian Petroleum Limited, Netherlands Institute of Applied Geoscience, Mobil Oil Canada

BENEFITS:

- coalbed methane offers a new, large source of natural gas for Alberta
- potential to provide an environmentally friendly energy supply
- potential to enhance natural gas production while limiting emissions of CO_2, the main greenhouse gas implicated in global warming

Source: Alberta Research Council. Contact: Bill Gunter, Environmental Technologies, Alberta Research Council, phone 780.450.5467, Email: gunter@arc.ab.ca, Web: www.arc.ab.ca

Calgary company's sulphur analysis systems gaining market share

Calgary-based Galvanic Applied Sciences Inc. is fast becoming a market leader in sulphur analysis.

Galvanic develops and manufactures intricate sulphur measurement systems for the industrial market. Its products encompass four groups: lead acetate based analyzer systems, sulphur chromatograph analyzers, TCD chromatographs and automation products. The process analyzers continuously measure process streams for hydrogen sulphide or other sulphur compounds for industry. The chromatographs are inexpensive systems for BTU measurements and other general chromatography applications. The automation products are used for computerizing gas well sites and in the natural gas processing, petrochemical and pulp and paper industries. A research and development group supports existing product improvements and the creation of new products.

Galvanic's new generation of analyzers are based on a new technology for sulphur analysis -- sulphur chemiluminescence. Its advantage over conventional technology is that it can detect all forms of sulphur in all kinds of hydrocarbons.

TECHNOLOGY: lead acetate based analyzer systems, sulphur chemiluminescence chromatograph analyzers, TCD chromatographs, and automation products

DEVELOPER: Galvanic Applied Sciences Inc., Calgary

SUPPORTER: Industrial Research Assistance Program (IRAP) of the National Research Council of Canada (NRC)

BENEFITS:

- Galvanic reported 1997 revenues of $2.4 million and 1998 revenues of $3.4 million
- achieved worldwide sales of its analyzers, international sales increased over 100% the previous year
- committed to an ongoing research program to improve existing products as well as develop new technologies and products. In 1998, Galvanic's R&D budget was $460,000
- all of the hardware and software design and maintenance is done by Galvanic staff at its facility in Calgary
- Galvanic Applied Sciences has 28 employees, seven of them in R&D.

Source: Galvanic Applied Sciences Inc. Contact: Byron Larson, president, Galvanic Applied Sciences, phone: 403.252.8470, email: larsonb@galvanic.ab.ca, Web: www.galvanic.ab.ca

C-FER's 3D analysis tool reduces oilfield maintenance

The process of identifying casing failure mode in the oilfield has always been a tricky business — until C-FER Technologies Inc. developed a decision support tool called CalTran. Designed as a preventative maintenance aid for oil production engineers who need to identify and anticipate casing deformations, the technology provides enhanced analysis upon which to base corrective action.

CalTran is a robust data interpretation algorithm, qualified by full-scale testing in C-FER's laboratory. It uses standard multi-arm caliper measurements to accurately project well casing geometry. Unlike conventional well bore surveys, CalTran can magnify localized casing deformations, providing insight into the probable failure mode.

The distinguishing feature of CalTran is its ability to transform casing cross-sectional measurements into a detailed three-dimensional representation of well casing geometry. This visualization of well casing orientation, curvature, cross-sectional geometry, and flexural strain is key to predicting the most probable failure mode. With this knowledge, decisions can reliably be made to modify well casing design and/or operating procedures and thereby mitigate well bore loading conditions.

CalTran is also valuable for monitoring movement in an entire formation by treating each well as a sensor. CalTran's well casing orientation data, together with original directional survey data, are critical components for assessing completion and production practices.

CalTran was originally developed for a C-FER customer to quantify in three dimensions the local 'anomalies' on multi-arm caliper surveys. The technology was also successfully used for an international client to characterize casing deformations in the overburden and reservoir of two North Sea oilfields.

TECHNOLOGY: CalTran software

DEVELOPER: C-FER Technologies Inc., Edmonton

BENEFITS:

- improves maintenance efficiency in producing oil and gas wells
- reduces the uncertainty in determining failure modes of deformed casing
- provides critical data for improving well completion design

Source: C-FER Technologies Inc. Contact: Sharon Rubuliak, marketing coordinator, phone 780.450.8989 x200, Email: s.rubuliak@cfertech.com Web: www.cfertech.com

C-FER Technologies pioneers new technique for pipeline risk analysis

Every decision a pipeline company makes – from the frequency of inline inspection to the scheduling of periodic aerial inspections – involves some consideration of risk. But rather than counting on "gut feeling", some companies are now using a formal method to make these decisions. Their technology of choice is PIRAMID™ software, developed by Edmonton-based C-FER Technologies Ltd.

PIRAMID stands for Pipeline Risk Analysis for Maintenance and Inspection Decisions. It provides users with tools that use quantitative risk analysis techniques to first prioritize pipeline segments for maintenance, and then optimize the maintenance of high-risk segments. The software's comprehensive approach addresses safety, and environmental and financial consequences of line failure.

The software is based on quantitative and objective methods, as opposed to the qualitative, largely subjective approaches used in existing evaluation techniques. In essence, PIRAMID uses hard facts rather than gut feelings. It provides a consistent, rational and objective approach to making maintenance decisions.

PIRAMID is the result of a joint industry program originally launched in 1994. The project was funded by pipeline operators, regulators and industry associations.

TECHNOLOGY: PIRAMID software for pipeline risk analysis for maintenance and inspection decisions

DEVELOPER: C-FER Technologies Inc., Edmonton

PARTICIPANTS: BC Gas Utility Ltd., British Gas plc, Enbridge Inc. (formerly Interprovincial Pipe Line Inc.), Foothills Pipe Lines Ltd., Gas Research Institute, National Energy Board of Canada, NOVA Corporation, TransCanada PipeLines, US Minerals Management Service

BENEFITS:

- PIRAMID offers a comprehensive approach to pipeline integrity management
- helps operators plan maintenance programs – keeping operating risks under control, and minimizing inspection and maintenance costs
- provides objective decision support for allocating limited maintenance resources, and selecting optimal maintenance actions

Source: C-FER Technologies Inc. Contact: Sharon Rubuliak, marketing coordinator, C-FER Technologies, phone 780.450.8989 x200, email: s.rubuliak@cfertech.com, Web: www.cfertech.com

New bitumen recovery technologies developed in Alberta

A breakthrough oil sands production technology developed in Alberta is now being made even more versatile with the development of two variations of the technology.

The initial breakthrough is called steam-assisted gravity drainage (SAGD), which allows for the economical recovery of oil from oil sands that lie too deeply buried for surface mining. SAGD involves drilling pairs of horizontal wells into the oil sands, one above the other. The top well injects steam into the oil sands, heating up the oil and allowing it to flow into the bottom well from where it is pumped to the surface.

SAGD is currently being used in a number of pilot and commercial projects. However, its major limitation is that it requires large amounts of steam, particularly in thinner, lower quality reservoirs. Dr. Roger Butler, who invented the SAGD process, and his team at the University of Calgary are now working on two variations of SAGD that reduce the energy requirement.

- **The Vapex (vapour extraction) process** involves injection of solvent vapours into the reservoir, usually using a horizontal well. The solvent dissolves in the oil and reduces its viscosity (by orders of magnitude); the diluted oil drains to a horizontal production well. Little heat is required.
- **The SAGP process** involves adding gas to the steam in SAGD. The temperature at the production well is nearly the same as in SAGD but gas accumulates in the upper part of the steam chamber where the temperature is much lower. Steam consumption is about 70% lower than with SAGD.

TECHNOLOGY: Vapex and SAGP processes for recovery of heavy oil and bitumen

INVENTOR: Dr. Roger Butler, University of Calgary

SUPPORTERS: *For Vapex:* CANMET, Amoco Canada Petroleum Company Limited, Imperial Oil Limited, Pan Canadian Petroleum Limited, Sceptre Resources Ltd., Shell Canada Limited, Texaco Canada Petroleum Inc., Wascana Energy Inc. and NSERC. *For SAGP:* Amoco Canada Petroleum Company Limited, Petro-Canada, Shell Canada Limited, Sperry-Sun Drilling Services, Suncor Energy Inc., Wascana Energy Inc., Northstar Energy Corporation, Mobil Oil Canada, Gulf Canada Resources Limited, Imperial Oil Limited, and Marathon Canada Limited.

BENEFITS:

- potential to improve the economy and economic range of application of SAGD. For example, because the Vapex process operates at the reservoir temperature and pressure, costs of well completions are lower with Vapex compared to a thermal process.

Source: University of Calgary. Contact: Roger Butler, Professor Emeritus, Chemical Engineering, University of Calgary, phone 403.220.7133.

New bitumen and heavy oil upgrading process ready for commercialization

Alberta scientists have invented a technology tailor-made for upgrading bitumen and heavy oil. The process, called $(HC)_3$ for "High conversion/Hydrocracking/Homogeneous catalyst", has a number of advantages over competing technologies. The $(HC)_3$ process was specially designed to take into account the unique properties (high trace metals and asphaltenes contents) of bitumen and heavy oil. Existing methods to upgrade bitumen and heavy oil are adaptations of technologies developed for conventional oil. Research on the $(HC)_3$ process began in 1988 as a joint venture between the Alberta Oil Sands Technology and Research Authority and the Alberta Research Council. Major technical challenges were resolved by 1993. Canadian and US patents were issued in 1993, 1996 and 1997.

$(HC)_3$ is a new generation hydrocracking process. It uses a commercial product as the catalyst precursor to form a very active and ultra- fine catalyst in the reactor. The catalyst allows asphaltenes – the bad actor in bitumen and heavy oil, to be converted more rapidly than the remainder of the oil. The result is smooth operation, higher liquid yield and a better quality product – critical requirements for economic and efficient upgrading. Unlike other processes the $(HC)_3$ process does not suffer from fouling and catalyst deactivation. While other processes require complex catalyst handling and preparation, the $(HC)_3$ process is marked by its simplicity. Whether it is operated at low conversion to upgrade heavy oil for pipeline transportation or 95% conversion to produce sweet, bottomless synthetic crude, there is no solid to handle at the end of the process.

The development team has taken $(HC)_3$ process development through to the pilot plant stage. Now, the Alberta Research Council is in discussion with Canadian oil companies and large engineering firms to commercialize the technology. An agreement to commercialize the $(HC)_3$ technology will be in place before the end of 1999.

TECHNOLOGY: $(HC)_3$ process for upgrading bitumen and heavy oil

DEVELOPMENT TEAM: Alberta Oil Sands Technology and Research Authority and Alberta Research Council.

BENEFITS:

- $(HC)_3$ technology is designed to upgrade a wide range of feedstock, including those rich in trace metals and asphaltene, over a wide range of conversion (40 – 95%) using moderate hydrogen pressure
- $(HC)_3$ technology uses a liquid phase reactor with part per million concentration of active colloidal catalyst intimately distributed among the heavy oil molecules. The reactor operates at constant temperature and constant catalyst activity without deactivation. There is no solid disposal issue even at 95% conversion. The result is smooth operation, higher liquid yield and a better, constant quality product.
- $(HC)_3$ technology offers process simplicity and operation flexibility. At low conversion $(HC)_3$ upgrades bitumen and heavy oils for direct pipeline transportation without the need for dilution. At high conversion $(HC)_3$ upgrades bitumen and heavy oils into valuable distillates and bottomless sweet synthetic crude.
- $(HC)_3$ technology requires less capital investment and lower operating cost.

Source: Alberta Research Council. Contact: Roger Lott, Heavy Oil and Oil Sands, Alberta Research Council, phone 780.450.5253, email: lott@arc.ab.ca, Web: www.arc.ab.ca

New oilfield drilling technology cuts fuel consumption and emissions

A small Edmonton-based research and development company has come up with an advanced oilfield drilling technology that will dramatically reduce fuel consumption.

Inert Gas Services Inc. has patented and field-tested the IGS 900, which produces and delivers compressed inert gas for use in oilfield drilling, tank and pipeline purging, and other industrial applications. The technology is a significant change in terms of the energy that is spent producing fuels and eliminating carbon dioxide emissions from oilfield systems.

Inert Gas Services has Canadian and foreign patents on the IGS 900, a portable stand-alone unit that generates inert gas by purifying the exhaust of an internal combustion engine equipped with three-way catalytic converters. It is mounted on two skids for truck transport and fuelled by propane.

The exhaust from the primary and booster compressor engines is purified, cooled and dried, then compressed to a high pressure, and delivered as an inert gas made up of nitrogen, carbon dioxide and argon. The gas is used to drive downhole drilling tools, to aerate drilling mud to control density, and other industrial uses.

TECHNOLOGY: IGS 900 unit for inert gas generation

COMPANY: Inert Gas Services Inc., Edmonton

DEVELOPERS: Mr. Al Graves, Inert Gas Services, and Dr. David Checkel, University of Alberta

BENEFITS:

- equipment and energy costs are half those of competing products.
- environmentally friendly compressor unit. The IGS 900 releases negligible emissions because its exhaust is used as product. Transportation and other emissions are reduced since less equipment is used and product is produced on site.

Source: University of Alberta. Contact: David Checkel, Mechanical Engineering, University of Alberta, phone 780.492.2340, Email: dave.checkel@ualberta.ca; Inert Gas Services, phone 780.444.4281

Wi-LAN finds eager market for wireless communications technology

Fast is an understatement when it comes to wireless technology from Calgary-based Wi-LAN Inc. The company has developed a new technology that has revolutionized the wireless communications industry. The technology called W-OFDM is the brainchild of Dr. Hatim Zaghloul (now president of Wi-LAN), working in collaboration with University of Calgary Electrical and Computer Engineering professor Dr. Michel Fattouche. In June 1999, I.WiLL™, a 30 Mbps wireless Ethernet bridge, based on W-OFDM was launched.

In 1992, the two colleagues founded Wi-LAN, an R&D and engineering company with a vision to build and market innovative, leading-edge spread spectrum wireless networking solutions. Wi-LAN soon developed two lines of direct sequence spread spectrum products – wireless modems and Ethernet bridges – that operate in the license-exempt Industrial, Scientific and Medical (ISM) frequency bands.

Wi-LAN products are now sold in 50 countries worldwide, generating 1998 revenues of $5.8 million. Wi-LAN has also targeted the installation of large integrated networks and wireless communications infrastructures as a key business opportunity. Wi-LAN believes that is wireless networking solutions will enable developed and developing nations to avoid costly wire-based telecommunication infrastructures and move into the wireless world of 21st century communications. The Company is currently working with several interested parties to establish national wireless communication infrastructures.

TECHNOLOGY: wireless data communications

COMPANY: Wi-LAN Inc., Calgary

COMMERCIALIZATION ASSISTANCE: University Technologies International, Calgary

PRODUCT PORTFOLIO: high-speed wireless local loop, wireless Ethernet bridges and modems

BENEFITS:

- successful commercialization of University of Calgary research
- in only seven years, Wi-LAN has achieved a significant position in the burgeoning wireless market and has earned a global reputation for leading edge wireless communications technology
- revenue of $5.8 million in 1998 – a 8.3% increase over 1997
- high-tech jobs for 55 Albertans
- many employees are U of C graduates, thus Wi-LAN is helping to keep Alberta's university graduates in Alberta
- growing export sales – from $4,183,000 in 1997 to $5,414,000 million in 1998

Source: University of Calgary. Contact:, Wanda Posehn, Wi-LAN, phone 403.273.9133, Email: info@wi-lan.com; Web, www.wi-lan.com

Engineering computers to diagnose breast cancer earlier

University of Calgary computer engineering professor Raj Rangayyan's research makes unique partnerships. His computer-aided breast cancer diagnosis program is bridging the fields of engineering, computers and medicine. Rangayyan has developed computer software that enhances digitized mammograms to improve their contrast, allowing radiologists to detect breast cancer at an earlier stage.

Breast cancer is a leading cause of death among women. Mammography is currently the best established procedure for breast cancer screening. However, mammograms are difficult to interpret visually because a developing cancer may be masked by superimposed tissue. The problem is compounded when radiologists must interpret large numbers of mammograms in screening programs, most of which are normal. Rangayyan's computer-aided image analysis techniques can be used to improve the accuracy of mammography and reduce the use of additional procedures such as biopsies.

Besides improving image quality, Rangayyan has taken his research a step further to study the shape and sharpness of breast tumours through computer analysis. His research team is developing ways to analyze the boundaries of tumours to determine if they are benign or malignant.

RESEARCH: computer-aided image analysis techniques to improve the accuracy of mammography

SCIENTIST: Dr. Raj Rangayyan, University of Calgary

COLLABORATORS: Dr. J.E.L. Desautels, Alberta Cancer Board: Dr. M.S. Rose, University of Calgary, Dr. H. Bryant, Alberta Cancer Board.

SUPPORTERS: Natural Sciences and Engineering Research Council of Canada, Alberta Heritage Foundation for Medical Research, Alberta Breast Cancer Foundation, University of Calgary Research Grants Committee

BENEFITS:

- improved diagnosis allows doctors to initiate treatment earlier or eliminates the need for repeated mammograms and biopsies
- by catching breast cancer in its early stage, Rangayyan's research has the potential to save lives and health care dollars
- the method also has enormous potential for training young radiologists to distinguish between malignant and benign breast tissue patterns

Source: University of Calgary. Contact: Dr. Raj Rangayyan, Electrical and Computer Engineering, University of Calgary, phone 403.220.6745, email: ranga@enel.ucalgary.ca

Madenta specializes in enabling devices for people with disabilities

In less than a decade in business, Edmonton-based Madenta Inc. has become a world leader in assistive technologies for persons with disabilities. The company uses computer technology to engineer products that enable independence in spite of severe physical disabilities.

Madenta targets two markets: computer access and environmental control. Its lead products in computer access are:

- *ScreenDoors*, software that places a computer keyboard on screen allowing full operation through any point-and-click device
- *Tracker* allows computer control by head movements only (a miniature camera translates head movements into mouse cursor movement)
- *WISP*, a puff switch to replace the mouse buttons.

Madenta's lead product in environmental control is:

- *PROXi*, an electronic device that uses a computer to control lights, electrical appliances, telephones, remote-controlled devices and intercom systems.

Madenta went public on the Alberta Stock Exchange in October 1997. In January 1998, the company entered into a licensing deal with Microsoft Corp., whereby a version of Madenta's on-screen keyboard will be packaged with *Windows*.

TECHNOLOGY: comprehensive line of assistive technologies for persons with disabilities

COMPANY: Madenta Inc., Edmonton

SUPPORTERS: Alberta Heritage Foundation for Medical Research, Industrial Research Assistance Program of the National Research Council

BENEFITS:

- sales have rocketed from $10,000 to $125,000 a month in four years. About 70 per cent of sales are to the US, with recent major inroads into European markets.
- high-tech jobs for 20 people
- establishment of a distribution channel for Madenta's products and other assistive technologies. Madenta has a network of 80 resellers throughout Canada, the US and Europe.
- Madenta's Randy Marsden received an Early Achievement Award from the Association of Professional Engineers, Geologists and Geophysicists of Alberta in 1995. Madenta won a National IWAY award in 1998.

Source: Madenta Inc. Contact: Randy Marsden, President, Madenta, phone 780.450-8926, email: randym@madenta.com, Web: www.madenta.com

Osteoporosis treatment reduces fractures by preventing bone loss

A University of Calgary professor was a member of the first scientific team to show that a drug can prevent fractures in a certain kind of osteoporosis. UofC endocrinologist Dr. David Hanley, along with other Canadian researchers, published the results of their study in the New England Journal of Medicine in August 1997.

The study showed that one year of treatment with a drug called etidronate combined with calcium prevented bone loss and vertebral fractures in patients who had osteoporosis caused by corticosteroid therapy. People with asthma, arthritis and other ailments are often treated with steroids, such as prednisone, to reduce inflammation. The trouble is that for many people, steroids cause bone loss and fragile bones that fracture far too easily. The researchers concluded that etidronate therapy protected all patient groups against bone loss and prevented vertebral fractures in post-menopausal women receiving corticosteroids.

Osteoporosis is a disease of the skeleton that results from problems with the body's ability to maintain or rebuild bone. Although it can result from steroid use, it also develops over time as a result of other factors that researchers are still working to identify. Women comprise 70 per cent of the estimated 1.4 million Canadians with the disease. Hanley's research may also provide insight into future therapies for all those who suffer from osteoporosis.

Hanley's work on the parathyroid gland, which regulates calcium in the body, led him into the area of osteoporosis research. His team at the UofC is part of the Canadian Multicentre Osteoporosis Study (CaMOS), a five-year Canada-wide study of the incidence and causes of osteoporosis.

RESEARCH: studies aimed understanding, treating and measuring osteoporosis

SCIENTIST: Dr. David Hanley, University of Calgary

SUPPORTERS of CaMOS: Health Canada, Medical Research Council of Canada, Merck Frosst, Eli Lilly, Dairy Farmers of Canada, Procter and Gamble, Alberta Heritage Foundation for Medical Research, the Dairy Farmer of Canada, I am also supported by Hoffman-LaRoche and Allelix

BENEFITS:

- more effective treatment for a condition that is likely to become more common as the population ages. Osteoporosis is already responsible for 25,000 hip fractures each year in Canada. This translates into $1.2 billion each year for acute, long-term and rehabilitative care for all osteoporotic fractures.

Source: University of Calgary. Contact: Dr. David Hanley, Endocrinology and Metabolism, University of Calgary, phone 403.220.3037, email: dahanley@acs.ucalgary.ca

U of C cancer research discovery touted worldwide

University of Calgary medical professor Dr. Patrick Lee and his research team made international news headlines in November 1998 when they announced a discovery that could one day provide new therapies for cancer patients.

Lee and his colleagues, graduate student Matthew Coffey, and professors James Strong and Peter Forsyth, discovered a naturally occurring human virus that kills cancer cells. The virus — called reovirus (reo is an acronym for respiratory enteric orphan) — is believed to cause mild infections of the upper respiratory and gastrointestinal tract of humans. The U of C researchers found that reovirus is a potent killer of cancer cells whose growth signal has gone awry. In a report published in the Nov. 13 issue of Science, one of the top two scientific journals in the world, Lee and his team used reovirus to treat both mouse tumours and human brain tumours (glioblastomas) implanted in mice.

"These results are beyond our wildest dreams," says Lee. "Based on the reovirus infection mechanism we have revealed, the more malignant the tumour, the more effective reovirus is in killing it. It's like the reovirus is saying: `If you're bad, you're the first to go.'"

TECHNOLOGY: reovirus - a naturally occurring human virus that kills cancer cells

SCIENTISTS: Dr. Patrick Lee, graduate student Matthew Coffey and Drs. James Strong and Peter Forsyth, University of Calgary

SUPPORTERS: The study leading to this discovery was funded by the Medical Research Council of Canada, the Alberta Cancer Board, and the Alberta Heritage Foundation for Medical Research. The infrastructure was provided by TransCanada Pipelines Ltd. through its donation to the Partners in Health Campaign.

BENEFITS:

- a potential therapy to treat cancer patients
- improves basic scientific understanding of cancer biology
- international recognition to Alberta as a leading research centre

Source: University of Calgary. Contact: Dr. Patrick W. K. Lee, U of C, phone 403.220.7548; Email, plee@ucalgary.ca

University of Alberta spinoff company develops fat-burning snack bars for athletes

Since 1991, Canadians have been able to keep away the winter chill with the Canadian Cold Buster bar, a snack bar designed to increase the body's production of heat. It was created by University of Alberta professor Dr. Larry Wang, from his research on the physiology of fat burning. Now, L & R Wang Enterprises Ltd. is marketing three new nutrition/energy bars in Canada, the US and the Pacific Rim.

The new bars are based on Dr. Wang's patented technology to increase the body's use of fat reserves. The *Access: Fat Conversion Activity Bar, Fat Lighter, and Fat Burner* bars, are based on Dr. Wang's 18 years of research into the chemical adenosine. Adenosine normally acts as a lock on body fat, inhibiting the burning of fat as well as the use of sugar by muscles. The new bars unlock adenosine by minimizing its binding to fat, nerve and muscle cells. The body can then burn fat more easily, allowing extended exercise without fatigue or soreness. Although each bar contains only 154 calories, they are designed to sustain vigorous exercise for two to three hours, using energy from the body's own fat reserves.

The energy bars are made with all natural food ingredients. Melaleuca of Canada, Inc. is the exclusive distributor of the *Access* bars in Canada.

TECHNOLOGY: nutrition/energy bars that stimulate the burning of fat

COMPANY: L & R Wang Enterprises Ltd., Edmonton

CANADIAN DISTRIBUTOR: Melaleuca of Canada, Inc.

DEVELOPMENT PARTNERS: University of Alberta; Food Processing Development Centre (Alberta Agriculture, Food and Rural Development), Leduc

SUPPORTERS: Natural Sciences and Engineering Research Council, Medical Research Council, National Defence, Alberta Heritage Foundation for Medical Research, University of Alberta

BENEFITS:

- commercialization of Alberta university research
- annual royalties to the University of Alberta and the Government of Canada
- improved endurance for athletes and others involved in activities/fat reduction
- thousands of independent Melaleuca marketers are selling *Access* bars

Source: Food Processing Development Centre. Contact: Dr. Larry Wang, University of Alberta, phone 780.492.4402; Email, larry.wang@ualberta.ca

Calgary company aims to be world-class provider of wireless location technology

It is surprising that even with the advent of cellular telephones in our day-to-day activities, there has never been a way of pinpointing the location of a wireless caller. Until now, that is. A Calgary company has developed a patented hardware/software technology that solves this shortcoming.

The technology is called Cellocate™; it has been developed for 10 years and is now commercially available and being marketed by Cell-Loc Inc. Cellocate™ easily fits into the cellular carrier's infrastructure with no modification to existing equipment. Cell-Loc's flagship product, Cellocate™-AMPS, was tested for over three years in TELUS Mobilities network in the northeast sector of Calgary. In addition, Cellocate™ is designed for seamless and cost efficient upgrades from analog (AMPS) to digital (CDMA,TDMA).

The Cellocate System™ has recently been deployed in two other cellular provider's networks; one network is located in North America while the other is located internationally (under the sales agreement, Cell-Loc is not permitted to release the customer's name or location).

While there are many applications for wireless location technology, the initial driving force responsible for the market's rapid growth is location-based emergency services as mandated by the Federal Communications Commission in the US. By October 2001, carriers will be required to provide phone location information within 125 metres of accuracy, 67% of the time. Other applications include: fleet/asset management for couriers and transportation businesses; tracking of stolen phones and/or criminals; tracking stolen vehicles; location-sensitive navigation; location-sensitive billing; and location of cellular and PCS telephone users.

At the core of Cell-Loc's product line is patented automatic location identification (ALI) technology developed by the company's co-founders Drs. Hatim Zaghloul and Michel Fattouche, in concert with a team of experts from the University of Calgary headed by Dr. Gerard Lachappelle.

TECHNOLOGY: patented technology, known as Cellocate System™ utilizing Super-resolution software which provides an order of magnitude in accurately locating cellular phones through existing cellular networks.

DEVELOPER: Cell-Loc Inc., Calgary

SUPPORTERS: Wi-LAN (sister company also co-founded by Dr. Michel Fattouche), National Research Council, Telus Mobility and other members of Mobility Canada, Agra Monenco, Signal Soft Corporation.

BENEFITS:

- a March 1997 report by a Washington, DC-based market research group pegs the value of the wireless location market at about $8.4 billion when the market matures
- provides significant market opportunities and alliances in the US and around the world

Source: Cell-Loc Inc.. Contact: Cassy Weber, marketing and public relations manager, Cell-Loc, phone 403.569.0760, email: cweber@cell-loc.com, Web: www.cell-loc.com.

High-tech products from MCK Communications make telecommuting a breeze

It started with a bright idea. In 1989, Calgarian Cal Manz decided to go ahead with the development and commercialization of products that allow people to "telecommute" – or work in branch offices instead of working at a central office. The result is MCK Communications Inc., a global leader in remote voice and data technology for remote workers.

MCK sells a suite of products that make telecommuting and working in a branch office, a seamless, transparent process. The company's specialized modems and other equipment allow anyone to work anywhere and have the same phone and computer capabilities as at the office. For example, a call centre that experiences a peak in calls between 5-7 pm might not want people to come in for just two hours. With MCK's products, they can work at the phone and computer set-up in their home.

Over 80 per cent of MCK's sales are outside Canada, most of them to Fortune 1000 companies. The company has 80 employees in Calgary and Boston.

TECHNOLOGY: specialized telecommunications and data communications products for telecommuting and branch office locations.

DEVELOPER: MCK Communications Inc., Calgary

SUPPORTER: Industrial Research Assistance Program (IRAP) of the National Research Council of Canada (NRC)

BENEFITS:

- new high-tech R&D and manufacturing business for Alberta
- company has 80 highly skilled employees, potential to hire 20 more engineers over the next year
- over 55,000 units have been installed
- exports account for 80 per cent of MCK's sales, and future market potential is much greater
- MCK has established OEM relationships with Nortel, NEC, Lucent and Alcatel
- enhances Alberta's reputation as a manufacturer of advanced telecommunications products

Source: Industrial Research Assistance Program. Contact: MCK Communications, Joan Lockhart, VP Marketing, phone 617.454.6100, or Wayne Leibel, Calgary general manager, phone 403.247.9777. Email, info@mck.com; Web, *www.mck.com*

Mapping technology assists Canadian soldiers

Two Alberta companies are partnering to better equip Canadian soldiers for the battlefield. Under the terms of a five-year exclusive partnership agreement, Axion Spatial Imaging Ltd. and Computing Devices' Canada Ltd.'s Calgary Operations have agreed to share technology and jointly develop new products for the military market. Axion, a leader in geographic data storage and retrieval technology, will provide its world-class Advanced Digital Mapping Technologies (ADMT) into Computing Devices' recently launched battleWEB™ battlefield command and control software.

battleWEB™ is being fielded with the Canadian Army as part of Computing Devices' $1.5-billion Iris Tactical Command, Control, and Communications System. It is a state-of-the-art military asset management and communications package that allows the commander on the battlefield to track and direct all his assets in near real-time, using global positioning satellites (GPS). Axion will provide the software engine for instantaneous moving map manipulation and display on a theater-wide scale. Within battleWEB™, detailed maps are scanned and will be stored in Axion's advanced image compression format. This boosts by a factor of up to 25 times the amount of geographic information available to today's soldier on the battlefield, without requiring expensive computer upgrades. The Computing Devices/Axion partnership will bring to the military market worldwide a capability that was heretofore unavailable.

TECHNOLOGY: ADMT – Advanced Digital Mapping Technology™, enhance the ability to store, display, transform and deliver large amounts of geo-imagery over internet, intranets and wireless communication. Reputed to be the world's fastest image display.

COMPANY: Axion Spatial Imaging Ltd., Edmonton; Computing Devices Canada Ltd.

BENEFITS:

- ADMT provides rapid access to huge amounts of information, economical disk and memory requirements
- potential commercial and consumer applications in: resource industries, search and rescue, emergency response, education and environment
- international exports of Alberta technology, bolstering Alberta's reputation as an R&D leader
- increases Alberta's presence in the billion dollar military market

Source: Axion Spatial Imaging Ltd. Contact: Grace Burke, Marketing Manager, Axion Spatial Imaging Ltd, phone: 780-423-4413, email: graceb@axionspatial.com, web: www.axionspatial.com

Laser cutters from Lacent Technologies Inc. are on the cutting edge

From men's suits, through automotive seating and airbags, to T-shirts, Lacent Technologies Inc. has a laser that can cut them all. The Edmonton-based company is rapidly establishing itself as a world leader in the development and manufacture of high-speed continuous process laser cutting systems.

Lacent's principal product is a line of high-speed continuous process textile laser cutting systems. Their applications include:

- Automotive: cutting of airbags, automotive seating and interior trim
- Apparel: cutting of casual pants, men's and women's suits, and high volume casual and athletic wear such as T-shirts and fleece products.
- Industrial textiles: cutting of aerospace materials, clean room wipes, and other industrial fabrics.

Lacent was incorporated in 1995. The company redefined its technology, originally developed by now-defunct General Systems Research Inc., and repositioned itself with a focus on high-value product cutting, precision and flexibility. This new direction has proven to be a recipe for success. Lacent's customers include Levi-Strauss, Fruit of the Loom, and Autoliv-Asp Inc. and TRW Inc.

Lacent is currently developing two lines of cutting systems. The Lacent 500 is a high-speed single or dual ply cutting system that uses a medium-power sealed gas laser. The Lacent 1000 will offer a number of advanced features including medium- to high-power lasers, multiple ply in-feed system, "nest on the fly" capability, and an automated system for the stacking of cut parts.

TECHNOLOGY: continuous process laser cutting systems

COMPANY: Lacent Technologies Inc.

SUPPORTERS: As of June 1998, Lacent completed a major private share placement providing the company with a strong financial base. Major shareholders include Manvest Inc., Landmark Global Financial Corp., Royal Bank Capital Corp., and Rothschild Quantico.

BENEFITS:

- Lacent has 15 full-time employees and projected annual sales of $4-5 million. Its business plan calls for substantial growth in employment over the next five years.
- Lacent is establishing itself as a world leader in the development and manufacture of high-speed continuous process laser cutting systems.

Source: Lacent Technologies Inc. Contact: Corey Smith, Lacent Technologies, phone: 780.944.0047, email: lacent@lacent.com

AGS raises hopes for diamond finds in Alberta

All that glitters isn't gold; in Alberta, that glitter just might be from diamonds. In 1996, the Alberta Geological Survey (AGS) released the results of a three-year study, *The Diamond Potential of Alberta; Bulletin No. 63*, which suggests that Alberta, known for its prolific oil and gas reserves, also has considerable potential for diamonds.

AGS initiated the research following the discovery of diamonds in the Northwest Territories and Saskatchewan. These diamond-bearing sites occur in the Precambrian rocks of the Canadian Shield, which also extend under the Alberta sedimentary basin. Diamonds are formed deep underground, then brought to the surface or near-surface in volcanic rock pipes, known as kimberlite or lamproite.

The AGS research identified target areas for diamond exploration based on geochemical results from samples collected. This, plus the wealth of associated geological, geophysical, and geochemical data, will assist mining companies in their exploration for diamonds in Alberta. Future AGS work will investigate and report fundamental geoscience data on a reconnaissance scale for northern Alberta. AGS is also working to provide exploration companies with a geoscientific database that can be used in diamond exploration.

This diamond prospecting has created a staking boom. In fact, 81 per cent of all stakeable ground in the province has been permitted by exploration companies from Alberta and around the world who hope to find the famous sparklers. Several sites in Alberta have produced encouraging results.

TECHNOLOGY: geological survey activities

AGENCY: Alberta Geological Survey, Alberta Energy and Utilities Board

SUPPORTERS: Canada-Alberta Partnership on Minerals 1992-1995; Western Economic Partnership Agreement 1997-2000

BENEFITS:

- establishes Alberta as having moderate to high potential for diamonds
- potential to diversify Alberta's mining sector
- national/international interest and investment in Alberta
- discovery of developable diamond deposits would benefit the province in terms of jobs, royalties, mining investment, and economic spin-offs for mining supply companies

Source: Alberta Geological Survey. Contact: Roy Eccles, AGS, phone 780.427.2671, email: eccles@enr.gov.ab.ca

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